

REMARKS/ARGUMENTS

Introductory Remarks

Claims 8 and 10 -16 are pending in the application. Claim 8 has been amended. The amendments of claim 8 do not include new matter. The amendments of claim 8 are supported throughout the specification and original claim 9. Claims 1-7 and 10 have been cancelled.

Claim Objections

Claim 13 was objected to because of informalities. Claim 13 has been amended and is now in proper form. The amendments of claim 13 do not include new matter. Accordingly, Applicants respectfully request that the objections be withdrawn.

Claim Rejections - 35 U.S.C. §102

Claims 1-16 were rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Nikolau *et al.*, US20020162137 (Nikolau). This rejection is respectfully traversed.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Indeed, [t]he identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). MPEP §2131.

Claim 8 has been amended to reflect that it is directed to a method that includes treating a plant or plant seed such that treatment decreases expression of an *REF1* gene in said plant or plant seed, and growing said treated plant or plant seed, wherein said growing results in a plant with reduced sinapine content.

Nikolau relates to nucleic acid and amino acid sequences of acetyl CoA synthetase (ACS), plastidic pyruvate dehydrogenase (pPDH), ATP citrate lyase (ACL), Arabidopsis pyruvate decarboxylase (PDC), and Arabidopsis aldehyde dehydrogenase (ALDH), specifically ALDH-2 and ALDH-4 (see Abstract). Nikolau does not disclose plants with reduced sinapine content. In fact, nowhere does Nikolau even mention sinapine or sinapic acid. Until the Applicants' discovery, it was not known in the art that decreased expression of *REF1* in plants results in plants with reduced sinapine content, nor was it known that *REF1* encodes a sinapaldehyde dehydrogenase required for sinapic acid and sinapate ester biosynthesis. The invention of amended claim 8 is neither taught nor suggested by Nikolau. Because the elements recited in amended claim 8 are missing from the Nikolau reference, as explained above, amended claim 8 is not anticipated by Nikolau. Amended claim 8 is therefore patentable. Claims 10-16 depend from amended claim 8. Because amended claim 8 is not anticipated and is patentable, claims 10-16 are allowable in view of the amendments and remarks pertaining to claim 8. Accordingly, these rejections are overcome and Applicants respectfully request that the rejections be withdrawn.

Claims 1-7 and 9 are now cancelled, rendering the rejections moot.

Claim Rejections - 35 U.S.C. §103

Claims 1-16 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Nikolau et al.*, US20020162137 (Nikolau) in view of *Keller et al.*, US Patent 6703539 (Keller). Applicants respectfully disagree with these rejections, because the Office has failed to establish a *prima facie* case of obviousness for any one of claims 1-16.

Claim 8 has been amended to reflect that it is directed to a method that includes treating a plant or plant seed such that treatment decreases expression of an *REF1* gene in said plant or plant seed, and growing said treated plant or plant seed, wherein said growing results in a plant with reduced sinapine content.

Nikolau relates to nucleic acid and amino acid sequences of acetyl CoA synthetase (ACS), plastidic pyruvate dehydrogenase (pPDH), ATP citrate lyase (ACL), Arabidopsis pyruvate decarboxylase (PDC), and Arabidopsis aldehyde dehydrogenase (ALDH), specifically ALDH-2 and ALDH-4 (see Abstract). As explained above, Nikolau does not disclose plants with reduced sinapine content.

Keller relates to methods for improving a nutritional profile of plants, and to genetically altered plants that include choline metabolizing enzymes (see independent claims 1 and 6). Keller briefly mentions betaine aldehyde dehydrogenase as a means of enhancing the conversion of the product of choline oxidase, betaine aldehyde, into glycinebetaine (see column 13, l. 3-10). Keller does not disclose methods that include treating a plant or plant seed such that the treatment decreases expression of an *REF1* gene in plants. Nowhere does Keller teach or suggest methods of using *REF1* to produce plants with reduced sinapine content. There is no suggestion or motivation in Keller to use *REF1* to produce plants with reduced sinapine content. Hence, Keller and Nikolau, taken alone or in combination, fail to teach or suggest all the limitations of the present invention.

Eukaryotic aldehyde dehydrogenases (EC 1.2.1), which oxidize aldehydes into carboxylic acids, are a large group of enzymes that have been classified into more than 20 families, and with over 550 aldehyde dehydrogenase genes identified across virtually all species. Until the Applicants' discovery, it was not known in the art that decreased expression of *REF1* in plants results in plants with reduced sinapine content. Indeed, some parts of the Applicants' work, demonstrating that *REF1* encodes a sinapaldehyde dehydrogenase required for sinapic acid and sinapate ester biosynthesis, were published in a very high profile scientific journal (Nair *et al.*, 2004, *The Plant Cell* 16: 544-554). Therefore, the present invention also shows unexpected results.

For at least these reasons the Office has failed to establish a *prima facie* case of obviousness for any one of claims 8 and 10-16. Amended claim 8 is therefore patentable. Claims 10-16 depend from amended claim 8. Because amended claim 8 is

patentable, claims 10-16 are allowable in view of the amendments and remarks pertaining to claim 8. Accordingly, these rejections are overcome and Applicants respectfully request that the rejections be withdrawn.

Claims 1-7 and 9 are now cancelled, rendering the rejections moot.

SUMMARY

The claims at issue distinguish over the cited references and are in condition for allowance. Applicants respectfully request the Examiner grant early allowance of this application. The Examiner is invited to contact the undersigned attorney for Applicants via telephone at (312) 321-4254 if such communication would expedite this application.

Respectfully submitted,

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